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**THE PRESENT LAND USE
of
PERLIS**

SIEW KAM YEW

NOVEMBER 1969

PRESENT LAND USE REPORT NO. 6.

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PRESENT LAND USE SURVEY OF WEST MALAYSIA

LAND USE REPORT OF PERLIS

by

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Before the resources of a country can be developed on a sound basis, a national resource inventory, based on scientific principles, must be carried out. With the resource inventory data at hand, sound long term development plans can be made, which when implemented can result in the development of suitable land presently unutilized and in settled areas the land use can be intensified, diversified or completely changed. One form of resource inventory is a Present Land Use Survey.

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A Present Land Use Survey will present, in some form or other, a picture of existing land utilization. The method of execution and the form of presentation depends on the scope of the survey, the degree of accuracy required, and the basic materials available. The usual end-products are a cartographical display and/or an area account of existing utilization.

The Author is indebted to the following Sections whose efforts have made this report possible.

The Interpretation Section under the direction of
Mr. J.D. McEachern,
Canadian Colombo Plan Land
Use Specialist/Geographer.

The Cartography Section under the direction of
Mr. G.W. Millington-Hogg,
Canadian Colombo Plan
Cartographer and
Mr. Cheah Phi Teik,
Cadet Cartographer.

- 1. Acreage statistics of all land use sub-categories.
- 2. Present Land Use Mapping (1966) at a scale of 1:25,000.
- 3. Present Land Use Mapping (1966), by States, at a scale of 2 atlas to an inch.

The Area Measurement Section under the direction of
Miss Chong Sew Ying.

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INTRODUCTION

Before the resources of a country can be developed on a sound basis, a national resource inventory, based on scientific principles, must be carried out. With the resource inventory data at hand, sound long term development plans can be made, which when implemented can result in the development of suitable land presently unutilized and in settled areas the land use can be intensified, diversified or completely changed. One form of resource inventory is a Present Land Use Survey.

A Present Land Use Survey will present, in some form or other, a picture of existing land utilization. The method of execution and the form of presentation depends on the scope of the survey, the degree of accuracy required, and the basic materials available. The usual end-products are a cartographical display and/or an area account of existing utilization.

The word "present" qualifies this type of survey and places emphasis on the current status of the information. It also indicates that the information decreases in value with time so that speed is essential in the data-gathering programme.

Up till now in West Malaysia the best cartographical display of land use has been contained in the National Topographical Mapping series and in State maps at smaller scales depicting land alienation. The land use information obtainable from this mapping, however, is insufficiently detailed, often out-of-date, and in many places misleading (land alienation often bearing no relationship to actual use). Acreage statistics of major crops and some land use sub-categories are obtainable from various government departments, but the validity and accuracy of such acreages are dependent on the survey methods employed with the result that values are not always completely accurate. Also, it is often difficult to relate such results to specific geographical locations.

The Present Land Use Survey is producing a complete, quick and accurate assessment of land use both cartographically and statistically, so that an account of all significant forms of land utilization is given and displayed for every Mukim and District of each State in the Country. The Planner can thus be supplied with a complete statistical inventory of the present land use, geographically displayed and with this full understanding of the situation the formulation of development plans is facilitated. Large and small scale mapping combined with acreage figures listed for all political units ensures the comprehensive supply of "bench mark" data for both the Local and National Planner.

The tangible end-products of the Survey are:-

1. Acreage statistics of all land use sub-categories.
2. Present Land Use Mapping (1966) at a scale of 1:25,000.
3. Present Land Use Mapping (1966), by States, at a scale of 2 miles to an inch.

Malaysian Agriculturists and Planners have realised for some time the need for such information, but it was not until the drawing up of the First Malaysia Plan that the requirement was crystallised into action. Under the Colombo Plan, the Canadian Government was requested to conduct a resource type survey over West Malaysia, which from a land use point of view, would entail the supply of medium scale aerial photography and the execution of a Present Land Use Survey.

The Canadian Government contracted Lockwood Survey Corporation of Toronto to conduct this Survey and Canadian aircrew and aircraft commenced the aerial photographic phase in early 1966. Aerial photographs at the scale of 1:25,000 were taken of the entire area of West Malaysia by early 1967 and the Present Land Use Survey could then commence.

Between January and July 1967, Lockwood Survey Corporation, under the Canadian Colombo Plan Programme, supplied the services of two Land Use Specialists and one Cartographic Specialist. It was their duty to set up a Land Use Section within the Soil Science Division of the Department of Agriculture and to commence production as soon as possible.

For convenience and through the helpful auspices of the Directorate of National Mapping, an Interpretation Section was established at the Directorate while an Area Measurement Section and a Cartographic Section were established in the Soil Science Division of the Department of Agriculture. The first State acreage results were produced by October 1967 and a programme has been devised to ensure that the production of all acreage results and 1:25,000 land use mapping will be completed in the latter half of 1969.

It should be remembered that the aerial photographs were taken during the period January 1966 to February 1967 so that the mapping and crop acreages which are being published will not include changes in land use which occurred subsequent to the date of actual photography.

Within a two-year period, reports will be written for all the States of West Malaysia. This particular report is on the Land Use of Perlis. The principal aims of this report are:-

1. To describe the methodology adopted.
2. To qualify the acreage statistics of State land use. (Contained in Appendix B).
3. To show the relationship between land use and soil suitability. (Contained in Appendix C).

At the conclusion of the Land Use Survey a comprehensive Land Use Report of West Malaysia covering all eleven States will be compiled. Then, with the availability of complete mapping coverage and acreage statistics it will be possible to discuss the land use of West Malaysia as an entity and, from the geographical point of view, to subdivide it into specific regions of characteristic land use.

METHODOLOGY OF SURVEY

An understanding of the methodology of the Present Land Use Survey can best be obtained from a brief description of the four distinct yet interlinked phases of the Survey.

Interpretation

Scaled 1:25,000 aerial photographs are stereoscopically inspected under power 3 magnification mirror stereoscopes and the photo image showing different types of land use is interpreted according to a land use classification legend (Appendix A). This legend is substantially the same as the one recommended by the Commission on World Land Use Survey (International Geographical Union) and only slightly modified to suit Malaysian conditions. Land Use sub-categories of two acres or larger are delineated in ink on the aerial photographs so that this annotated photography becomes a permanent record of the survey. There are approximately 18,000 aerial photographs in this 1:25,000 photographic coverage of which about 160 cover the State of Perlis (Figure.8).

Interpreted photographs are then closely checked by a second interpreter before being passed on for compilation.

Manuscript Compilation

The interpreted scaled photographs are keyed to the transparent compilation bases of the 1:25,000 national mapping series and the delineated land use boundaries are traced onto a manuscript of dimensionally stable film (Durafilm). At this stage a certain amount of planimetric detail and all local political boundaries are added. This facilitates future field orientation of the final maps and enables acreage counts to be made for the smallest political unit - namely, the Mukim.

Area Measurement and Tabulation

The manuscript is the basis for the next two phases - area measurement and fairdrawing.

On each 1:25,000 land use manuscript an acreage count using a dot grid, is made for each sub-category and these counts are tabulated by Mukims. At this stage a valuable check is made by ensuring that the cumulative physical acreage of all the small sub-category units equals that of the total physical acreage of the gridded sheet. A further check is made by repeating the whole process and comparing the results for the same sub-category from the two counts. This double count ensures that each individual sub-category is correctly measured.

When a district has been interpreted and mapped in manuscript form it is possible to compile a District Abstract of land use acreage where all acreages are listed under Mukims. From this abstract a separate District Summary sheet of acreage is compiled, where the acreages of all nine land use categories and their sub-categories are presented as percentages of the district as a whole. The total agricultural acreage is given and presented as a percentage of the district while agricultural sub-categories are shown as a percentage both of agricultural land and of the district as a whole. A State Summary of land use acreage (the one for Perlis is Appendix B of this report) follows substantially the same outline as the District Summary with the combined State Land Use acreages and percentages being listed as well as those for the component districts. In Perlis where there is only one district, the State Summary is identical with the District Summary.

Thus, a complete picture of land use is presented. The "whole" has been obtained by inspection, delineation and classification of the entirety. Regardless of the limitations imposed by the aerial photographic method, it can confidently be stated that an accurate universal picture is obtained and that, as far as the major crops are concerned, the results can be considered as those of an accurate crop survey.

Fairdrawing

The final 1:25,000 map sheet is compiled by a fairdrawn tracing of the manuscript on dimensionally stable film (Durafilm). This is the final record from which printed maps or dyeline copies can be made; these may then be hand-coloured by the user according to a recognised colour system suggested by the Commission on World Land Use. The anticipated market for this scale of land use mapping is likely to be limited and therefore a coloured series at this scale is not being produced.

Depending on the demand, a printed coloured land use map series at a scale of 2 miles to an inch can be published for all States. The uncoloured version, enclosed in the back cover pocket, is presented with the report.

Land use mapping at this scale is useful as it gives an overall picture of the present conditions as well as facilitating regional and state planning. The 2 miles to one inch Land Use Map of Perlis was compiled by condensing 9 of the 1:25,000 map sheets.

THE PHYSICAL ENVIRONMENT

Perlis is the smallest state in West Malaysia, and has only one administrative district which is also known by the same name. The total area of the State is 313.8 square miles and it measures 32 miles and 15 miles at its longest and widest dimensions respectively. Situated, at the north-west corner of West Malaysia and lying between the 6th and 7th parallels of the North Latitude, the State is bounded on the south-west by the Straits of Malacca; the north-west, north and northeast by Thailand; and the east and south by the State of Kedah. (Figure 1).

101° E

103°

Sekil Lebih Kurang 54 Batu Sa-Inchi

Sekil 0 10 20 30 40 50 Batu

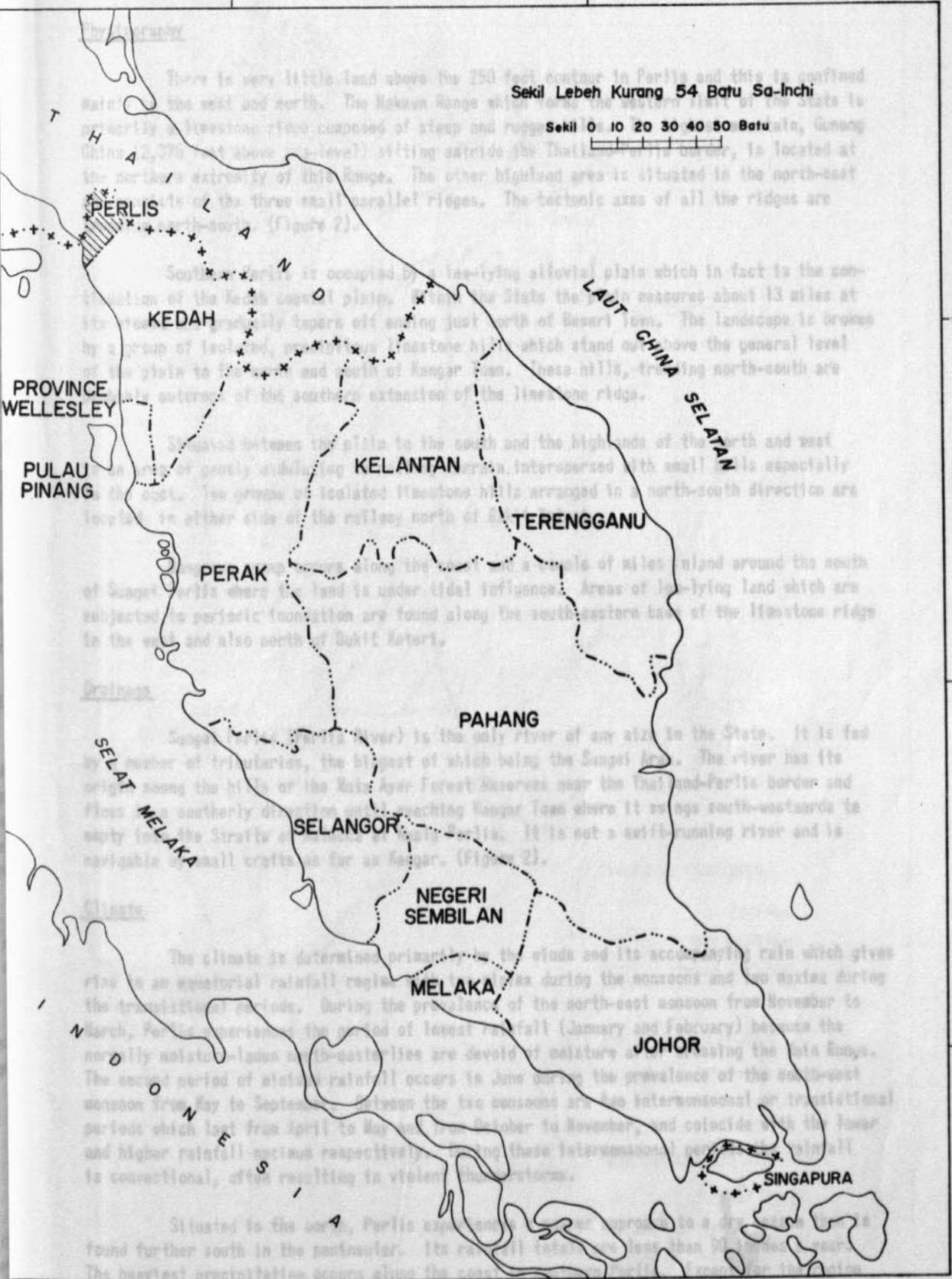
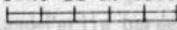


Figure 1. Location of the State of Perlis within West Malaysia.

Physiography

There is very little land above the 250 foot contour in Perlis and this is confined mainly to the west and north. The Nakawm Range which forms the western limit of the State is primarily a limestone ridge composed of steep and rugged hills. The highest mountain, Gunung China (2,376 feet above sea-level) sitting astride the Thailand-Perlis border, is located at the northern extremity of this Range. The other highland area is situated in the north-east and consists of the three small parallel ridges. The tectonic axes of all the ridges are trending north-south. (Figure 2).

Southern Perlis is occupied by a low-lying alluvial plain which in fact is the continuation of the Kedah coastal plain. Within the State the plain measures about 13 miles at its widest and gradually tapers off ending just north of Beseri Town. The landscape is broken by a group of isolated, precipitous limestone hills which stand out above the general level of the plain to the north and south of Kangar Town. These hills, trending north-south are probably outcrops of the southern extension of the limestone ridge.

Situated between the plain in the south and the highlands of the north and west is an area of gently undulating to rolling terrain interspersed with small hills especially in the east. Two groups of isolated limestone hills arranged in a north-south direction are located in either side of the railway north of Bukit Keteri.

Mangrove swamp occurs along the coast and a couple of miles inland around the mouth of Sungai Perlis where the land is under tidal influence. Areas of low-lying land which are subjected to periodic inundation are found along the south-eastern base of the limestone ridge in the west and also north of Bukit Keteri.

Drainage

Sungei Perlis (Perlis River) is the only river of any size in the State. It is fed by a number of tributaries, the biggest of which being the Sungei Arau. The river has its origin among the hills of the Mata Ayer Forest Reserves near the Thailand-Perlis border and flows in a southerly direction until reaching Kangar Town where it swings south-westwards to empty into the Straits of Malacca at Kuala Perlis. It is not a swift-running river and is navigable by small crafts as far as Kangar. (Figure 2).

Climate

The climate is determined primarily by the winds and its accompanying rain which gives rise to an equatorial rainfall regime with two minima during the monsoons and two maxima during the transitional periods. During the prevalence of the north-east monsoon from November to March, Perlis experiences the period of lowest rainfall (January and February) because the normally moisture-laden north-easterlies are devoid of moisture after crossing the Main Range. The second period of minimum rainfall occurs in June during the prevalence of the south-west monsoon from May to September. Between the two monsoons are two intermonsoonal or transitional periods which last from April to May and from October to November, and coincide with the lower and higher rainfall maximum respectively. During these intermonsoonal periods the rainfall is convectional, often resulting in violent thunderstorms.

Situated in the north, Perlis experiences a nearer approach to a dry season than is found further south in the peninsular. Its rainfall totals are less than 90 inches a year. The heaviest precipitation occurs along the coast in southern Perlis. Except for the region along the Nakawm Range the entire northern Perlis has an annual rainfall of less than 70 inches. (Fig. 3). During the 'dry' months of January and February, long dry spells with less than 0.01 inches of rainfall per day are quite common. At Kangar, the average rainfall for these two months is only 1.7 inches per month. (Dale, 1959).

SCALE 1:253,440

Batu 5 4 3 2 1 0 5 10 Batu

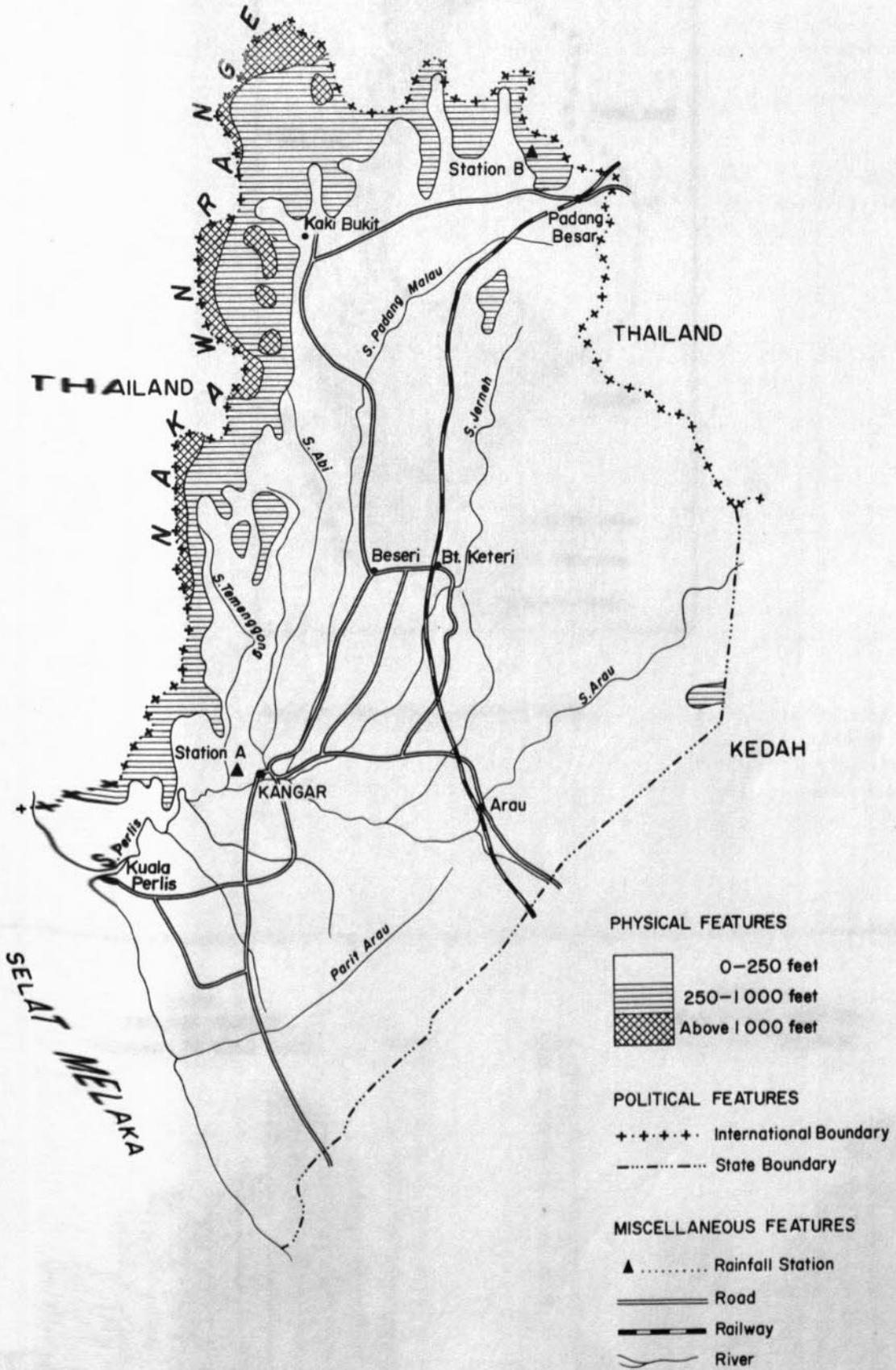


Figure 2. The main physical and political features of Perlis and the two rainfall stations.

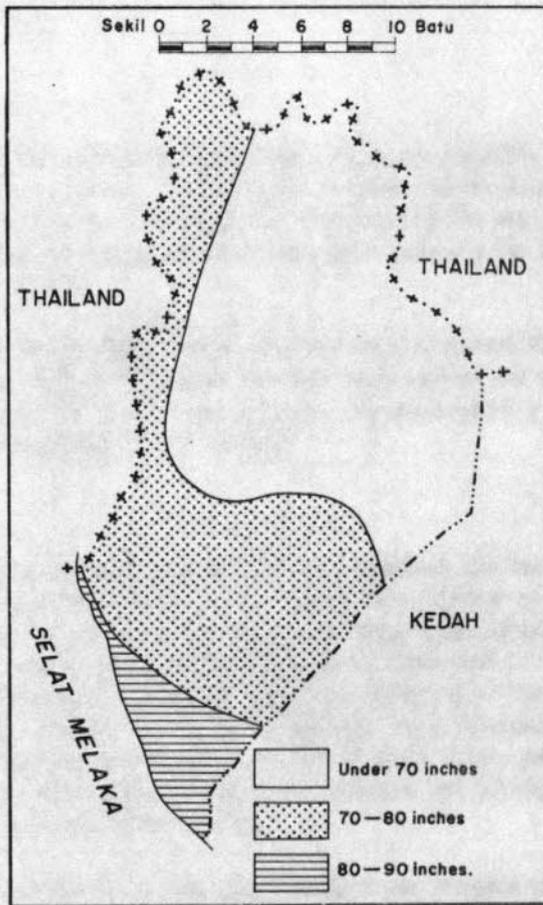


Figure 3. Mean annual rainfall of Perlis.

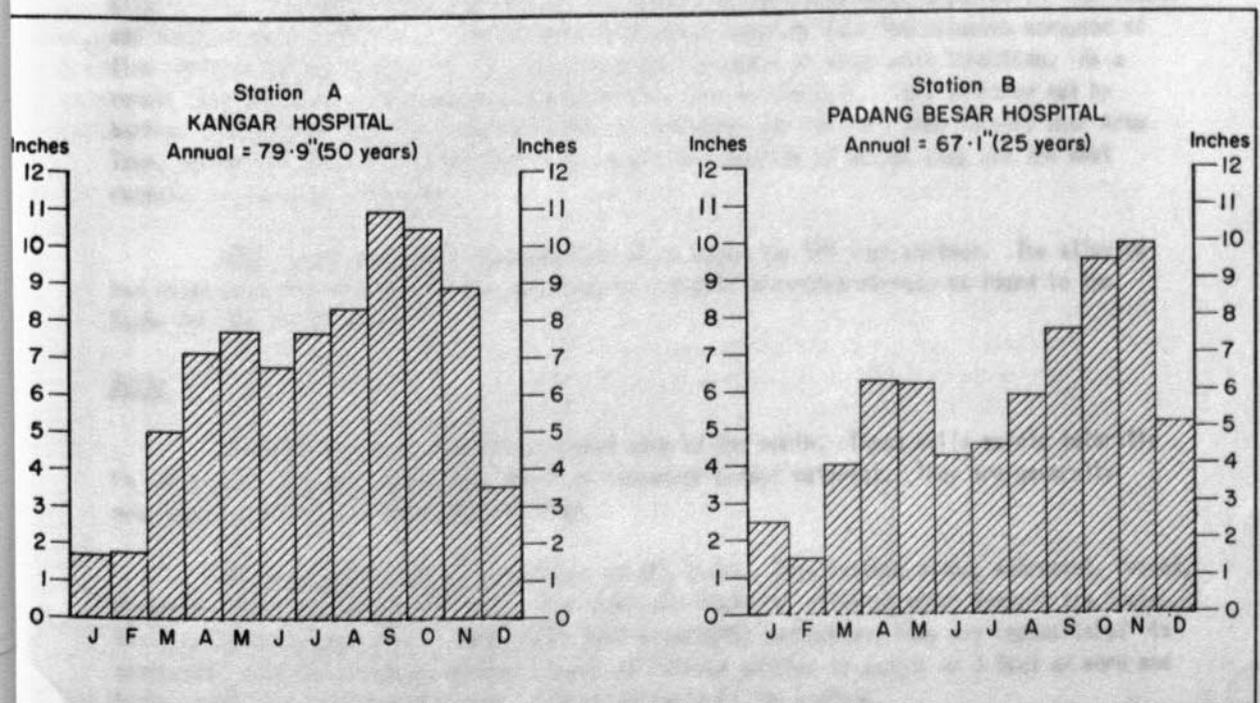


Figure 4. Average monthly precipitation for two rainfall stations in Perlis.

In figure 4, two histograms representing the average monthly rainfall distribution of Kangar and Padang Besar are given. The positions of these two rainfall stations are indicated in figure 2. It is possible to distinguish the difference in the mean annual precipitation in the north and south from the histograms which also depict clearly the 2 maxima and minima in the rainfall regime of Perlis.

Temperatures in the State remain uniformly high throughout the year. The mean annual temperature ranges from 78°F to 80°F while the mean daily maximum and minimum temperatures vary between 85°F to 90°F and 70°F to 75°F respectively. Relative humidity is constantly high ranging between 82 to 86 percent on the lowland.

Geology

In the geologic succession of Perlis, the limestones are the oldest rocks and they have been correlated both structurally and by fossils to be similar to the limestones of Langkawi Islands and are of two different ages. The Ordovician /Silurian period is represented by the dark grey limestone of the Setul Formation which forms part of the Nakawn Range. The Permian period is represented by the grey crystalline limestone of the Chuping Formation in the north. The Permian limestone is virtually unbroken for a thickness of some 2,000 feet in certain places and is divided by the intercalations of shale into a number of separate horizons. Both these limestone formations probably continue southward and outcrop through the alluvium to form series of isolated precipitous hills.

The northern extremity of the Setul Formation was intruded by granite magma during the post-Permian (probably Jurassic) era. Subsequent earth movements and the removal of the overlying crust by erosion have resulted in the exposure of the granite.

The Carboniferous period is represented by the Singha (Kubang Pasu) Formation which is composed of mudstones, siltstones, shales and sandstones. A small pocket of sedimentary rock belonging to the Tertiary (probably Miocene) period is located in the north-east near the Thai-Perlis border. Younger than the granite, it is thought to be a small basin deposit either lacustrine or estuarine whose successions include sandstones, shales, conglomerate and a thin coal seam.

The plain in southern Perlis was formed by the accumulation of semi-consolidated alluvial deposits mostly laid down during the changes in sea-level which occurred in Pleistocene and probably Recent times. Evidence gathered strongly suggests that the alluvium composed of fine sandy sediments overlay an irregularly-eroded basement of older rock formation. As a result the thickness of the alluvial deposits also vary accordingly. This is borne out by borings which showed that the greatest depth of sediments was 108 feet deep located near Arau Town. Along the coast and around the river mouth the deposits of marine clay are the most recently accumulated sediments.

Older alluvium occurs approximately at or below the 150 foot contour. The alluvium has since been considerably eroded resulting in a highly dissected terrain as found in the Rimba Mas Forest Reserve.

Soils

Sedentary soils in Perlis are found only in the north. These soils mainly lateritic in nature, are derived from either shale or limestone parent material. They are generally poor soils and have a limited distribution.

Alluvial soils cover a major part of the State. They include older, subrecent, recent, riverine, local and marine alluvium. The older and subrecent alluvium occur towards the foot-hills on dissected terraces. These soils have a variable texture and they are impoverished in nutrients. Some of them have distinct bands of rounded pebbles at depths of 3 feet or more and their gravel content increases with increase in depth of the profile.

The recent riverine alluvium is found along the flood plains of major rivers. The levees consist of a free-draining fine sandy loam soil. The soils of the backwaters on these plains have a variable texture and they are usually gleyed at 2 feet depth or lower because of a higher water table.

Along the tributaries the soils are developed from local alluvium and usually waterlogged. Consequently these soils are highly gleyed and have very poor profile development. They are variable in texture ranging from a fine sandy loam to a silty clay loam.

The marine alluvial soils are found in southern Perlis. They have been classified into a number of series according to the degree of profile development. The more juvenile soils are found along the coast while the more developed soils having 3 or 4 distinct horizons are found further inland. Along the coast and at the river estuaries where the alluvium is subjected to tidal influence, the soils formed are saline in nature. In areas with depressional or lagoonal conditions, acid sulphate soils have been found.

Further inland, between the areas occupied by marine and riverine alluvium is an area where the marine clays are mixed with the old river terrace soils. Consequently the texture of the resultant soils is lighter with a silty clay topsoil grading into clays in the subsoils. Such soils have well-developed profiles and the permanent water table is well below 3 feet.

THE PRESENT LAND USE

General

Perlis was formerly part of the ancient Sultanate of Kedah and later became a separate State in 1721 under the suzerainty of Siam. In 1909, it was placed under British rule after the signing of the Anglo-Siamese Treaty.

Since the settlers first moved in to develop the land, the land use pattern in Perlis has gradually evolved to its present status. The present land use pattern is not one of intense use, but, the picture is that of a more developed plain in the south as compared to the less developed upland in the north.

Out of the state area of 200,815 acres (313.8 square miles), a total of 103,608 acres amounting to approximately 52 percent have been utilized for agricultural purposes. Agriculture is centred primarily on the extensive alluvial plain where padi, the most important crop in the State, is cultivated. Situated on higher grounds in the plain and alongside roads, rivers and canal embankments are the majority of the areas under 'kampong' type mixed horticulture. This type of land use is a grouping of small farms generally arranged in a linear pattern. Rubber, the second most important crop, is mainly cultivated in the north which has a gently undulating to rolling terrain. Apart from padi and rubber, very few other crops are cultivated in the State.

The non-agricultural land is found mainly in northern Perlis where extensive areas are under forest, scrub forest or scrub grassland. Limestone outcrops generally in the form of isolated hills with bare cliffs and scrub-covered tops are also quite common. Normally these limestone outcrops are not used for agricultural exploitation. Along the limestone ridge in the west are basins and hollows known locally as 'wangs'. Each is a low-lying flat piece of land surrounded on all sides by vertical cliffs and some of them are large enough to support settlements.

Salient Statistics

The present land use of Perlis is summarised statistically in the State Land Use Summary as presented in Appendix B. Normally, this Summary is compiled from the District Land Use Abstracts which contain the land use acreages for all the Mukims. But in the case of Perlis, the District Land Use Abstract cannot be compiled because of the inavailability of some of the Mukim boundaries. Consequently the State Land Use Summary is obtained by the summation of the land use acreages measured from all the 9 manuscripts covering the State at a scale of 1:25,000.

In the future, when all the Mukim boundaries become available, the District Land Use Abstract listing all the Mukims will be compiled and made available to interested parties.

The following are the salient features of the State Land Use in 1966.

1. The area of Perlis State is 200,815 acres or 313.8 square miles.
2. 51.6 percent of the State was under agricultural use, supporting only a small range of crops.
3. Padi cultivation occupied 69,746 acres or 34.7 percent of the State.
4. 18,444 acres accounting for 9.2 percent of the State were planted with rubber.
5. A total of 13,686 acres amounting to 6.8 percent of the State was under 'Mixed Horticulture'.
6. 0.3 percent of the State, equivalent to 696 acres, was under coconut.
7. The total area under forest, scrub forest and scrub grassland was 78,274 acres, equivalent to 39.0 percent of the State.
8. The total area occupied by swamps in the State was 3,983 acres or 2.0 percent.
9. 'Unused Land' totalled 11,838 acres, amounting to 5.9 percent of the State.

The distribution of the major land use categories within Perlis is illustrated in figure 5.

Urbanisation

The total area under pure urban (IU) land use was 973 acres or only 0.5 percent of the State. There are few towns and village settlements in Perlis and the majority of these are very small. They are mostly found in the more developed south. The principal towns are Kangar (the State Capital), the Royal Town of Arau, Simpang Ampat and Kaki Bukit. Kangar, situated on the banks of the Sungai Perlis is the largest town and besides being the seat of the State Government, it also serves as the main trading and collecting centre for the produce of the State.

Estate urbanisation is the settling of workers in compact residential areas. In cases where the estates are large, amenities and facilities in the form of schools, hospitals, community halls, temples and play-fields are provided in addition to offices, factories and stores.

In Perlis, only an insignificant total of 16 acres was mapped under the sub-category, "Estate Building", indicating the absence of any major estate development.

Since estate development is negligible and there are few towns in the State, it is reasonable to expect an appreciable amount of the population to reside within the sub-category "Mixed Horticulture". This is substantiated by the fact that more than 75 percent of the State population is composed of the rural-oriented Malays.

The "Mixed Horticulture" sub-category very often merged with areas of pure urbanisation and became semi-urban in character where the housing to holding ratio approached 50 percent. The main criterion for interpreting an area as IU 'Urban' was that more than 50 percent of it should be occupied by housing and its related compounds. To the contrary, "Mixed Horticulture" normally has less than 50 percent of the area under housing. Hence, taking a conservative guesstimate that 45 percent of the land under "Mixed Horticulture" was occupied by housing, it would be reasonable to add 6,158 acres to the sub-category IU 'Urban'.

Rubber

In Perlis, the survey mapped a total of 13,585 acres equivalent to 8.8 percent of the State under rubber. From the Survey, the total area mapped as rubber was 18,444 acres. Although with this acreage rubber ranked as the second most important crop next to padi, it accounted for only 9.2 percent of the State acreage and 17.8 percent of the land under agricultural use in 1966. Most of the rubber was planted in northern Perlis where the undulating terrain is not suitable for padi cultivation.

The following supplementary information on estate rubber was obtained from the Statistics Department.

- a. Perlis had only five estates which together had a total planted acreage of 1,997 in 1966.
- b. The biggest estate was under 1,000 acres in size.
- c. Of the 1,997 acres of estate rubber, 509 acres amounting to 25.5 percent were immature trees.
- d. 54.6 percent of the estate rubber was planted with high yielding materials.
- e. The total estate production in 1966 was 454 tons while the smallholding production was estimated at 1,846 tons.

Since the total area under rubber as mapped from aerial photographs was 18,444 acres and the total area of estate rubber was 1,997 acres, by subtraction, the area under smallholdings would be 16,447 acres, equivalent to 89.2 percent of the total rubber acreage.

In 1966, Perlis produced a total of 2,300 tons of rubber while the total rubber production for West Malaysia was 900,278 tons.

Orchard

Only 147 acres, accounting for 0.1 percent of the land under agricultural use were mapped as orchard. The total included only those regularly planted and well-maintained pure orchard areas of two acres or more in size. This acreage could be slightly bigger if orchard holdings smaller than two acres in size found in other categories, especially under 2H, 'Mixed Horticulture' were mapped. Furthermore, the sub-category 'Mixed Horticulture' also included a wide range of fruit trees planted with a varying intensity in a haphazard pattern.

Coconut

Only a total of 696 acres of pure coconut was mapped from the aerial photographs taken in 1966. These pure stands of coconut were found only in the form of smallholdings scattered mainly among the sub-category 2H "Mixed Horticulture" in southern Perlis.

There were no coconut estates in the State.

Coconut was also found abundantly, within the sub-category "Mixed Horticulture" in close association with other crops especially banana and arecanut palms. It will be shown later that about 2,700 acres of coconut were found within this sub-category. Thus it can be conservatively stated that there were about 3,400 acres of coconut in Perlis in 1966.

Mixed Horticulture

This sub-category is a grouping of small farm units, each cultivating an assortment of both subsistence and cash crops in a haphazard and casual way around the house. The types of crops grown may vary from place to place, depending on the geographic location, soil condition and local tradition, but the emphasis is on subsistence. The farms are generally arranged in a linear pattern alongside roads, footpaths, water-ways and on grounds of higher elevation in padi-growing areas.

In Perlis, the survey mapped a total of 13,686 acres equivalent to 6.8 percent of the State under the sub-category "Mixed Horticulture". The majority was located on the alluvial plain in the south. The types of crops cultivated were coconut, banana, arecanut, fruit trees, vegetables, spices, tapioca, sweet potato etc. Coconut was the dominant crop in the south, while in the north where the distribution of this sub-category was relatively sparse, fruit trees were more abundant.

In the absence of proper sample studies, a very rough estimate of the breakdown of this sub-category would be:- coconut 20 percent; fruit trees 10 percent; vegetables and spices 10 percent; sweet potato, tapioca, maize, sugar cane, arecanut, sago 10 percent; banana 5 percent; buildings, footpaths, courtyards, negative land 45 percent.

Since the State had a total of 13,686 acres under "Mixed Horticulture" the above breakdown would give 2,737 acres of coconut; 1,368 acres of fruit trees; 1,368 acres of vegetables and spices; 1,368 acres of sweet potato, arecanut, tapioca, nipah and sago and 684 acres of bananas.

Market Gardening

The growing of vegetables and other short-term crops for sale is essentially the vocation of the Chinese community. It is a highly intensive form of agriculture involving the cultivation of small plots of short-term crops and vegetables. Sometimes this practice is combined with pig, fish and poultry rearing. The market garden areas are generally located on the outskirts of towns and villages and cater for the nearby areas of high population densities.

In the Survey the total area mapped as 'Market Gardening' in the State was only 40 acres. Most of this acreage was found in Kampong Kubang. It should be noted that this total included only those areas of 'Market Gardening' that were large enough to be mapped. But field checking has revealed the existence of a number of very small areas of 'Market Gardening' in various parts of the State. Due to their size which was generally less than 2 acres, these areas were mapped under other categories especially 'Mixed Horticulture'. Vegetables and spices cultivated on a subsistence basis were also found within the sub-category 'Mixed Horticulture'.

The small acreage under 'Market Gardening' can be attributed to a number of factors. Firstly, there is a lack of large urban centres in the State. Secondly, the State has a small population and more than 75 percent of it is composed of Malays who are generally found dispersed within the sub-category 'Mixed Horticulture'. Although these rural-oriented Malays also cultivate vegetables, they do not share the same interest with the Chinese in growing vegetables primarily for commercial purposes. Finally, the drier weather experienced in the State does not contribute to the ready availability of water which is very essential to vegetable cultivation.

Diversified Crops

Although this sub-category comprises such short term crops as water-melon, tobacco, banana, sugar-cane, sweet potato, tapioca, groundnut, maize etc., growing in reasonably extensive areas, the individual units or fields may be quite small. Sometimes a single crop is cultivated over the whole area resulting in a homogeneous appearance. More often than not, a number of different crops are cultivated side by side in small units or fields interspersed with fallow land. The small size of the individual units or fields together with the divergence of the crops cultivated make it impossible to map the individual crops. Consequently the crops are grouped together and mapped under the sub-category 'Diversified Crops'.

In all, a total of 514 acres amounting to 0.5 percent of the cultivated land in Perlis were mapped as 'Diversified Crops'. This sub-category was found in a number of places mainly to the north of the plain. It was usually associated with scrub-grassland which could probably be cleared land left unused, abandoned or fallow land from which a previous crop has been harvested. These areas of 'Diversified Crops' were all under the management of smallholders.

Banana:- Both the extent of its cultivation and the scale of the aerial photographs were not large enough to enable the interpretation and delineation of this crop from the photo-image. Consequently, this crop was not included in the Statistical Summaries.

But from field observation banana was found to be widely distributed in the State, especially in the padi-growing region of the south. Areas of pure banana occurred only in very small acreages in various parts of the State. It was more commonly found within the sub-category 'Mixed Horticulture' usually in association with coconuts or in areas of 'Diversified Crops'. Banana was also a common sight around dwellings within urbanised area.

Forest, Scrub Forest, Scrub Grassland and Swamp

The above non-agricultural sub-categories together occupied an area of 82,257 acres representing 41.0 percent of the State. The bulk of this total was located in the north where extensive areas of these sub-categories were mapped.

Forest (dryland) alone accounted for 45,363 acres amounting to 22.6 percent of the State. Most of this forest was found as a continuous belt skirting the Perlis-Thailand international boundary except in the north-west where the continuity was broken by the limestone ridge.

There was a total of 23,765 acres representing 11.8 percent of the State under the sub-category 'Scrub-Forest'. This acreage was located mainly in eastern Perlis along the edge of the forest.

The total area mapped under the sub-category 'Scrub-Grassland' was 9,146 acres. Virtually all the land occupied by 'Scrub-Grassland' was located in northern Perlis in close association with scrub-forest and land cultivated with rubber. Some of the areas, under this sub-category 'Scrub-Grassland' were quite extensive and in fact were clearings overgrown with scrub and lalang (*Imperata cylindrica*) after repeated unsuccessful attempts at rubber cultivation.

A total of 3,983 acres were identified as swamps in the State. This swamp acreage included both the mangrove swamp along the coast and estuary of Sungei Perlis and the inland areas under seasonal inundation.

Unused Land

Limestone outcrops appearing as characteristically steep-sided hills, often bare of vegetation, are a common landscape feature in Perlis. These outcrops are not suitable for agricultural exploitation and as such are mapped as 'Unused Land.'

In the Survey, a total of 11,838 acres representing 5.9 percent of the State were mapped under this category.

DISTRIBUTION OF SOIL SUITABILITY CLASSES WITHIN PERLIS

In 1967, the staff of the Soil Science Division conducted a reconnaissance soil survey of Perlis State. (Paramanathan and Soo, to be published). Following its completion the soils have been classified according to the soil suitability classification adopted by the Soil Science Division of the Department of Agriculture, Kuala Lumpur. The broad outline of this suitability classification is given in Appendix D. while Table D.1 of the same Appendix is a summary of the factors limiting crop growth.

The distribution of the five soil suitability classes for the State of Perlis is presented in table C.2 of Appendix C.

Class 1 soils occurred only in southern Perlis. They covered a total area of 29,520 acres equivalent to 14.7 percent of the State. These soils comprised the more fertile and better drained marine clays distributed mainly along the coastal half of southern Perlis.

Class 2 soils were found primarily in northern and north-eastern Perlis. Together they occupied 27,512 acres of land surface of the State.

Soils of Class 3 suitability had the largest distribution. Extending from north of Kangar to the northern limits of the State, and from the eastern boundary with Kedah to the base of the limestone ridge, these soils occurred mainly on undulating terrain. Their coverage totalled 96,391 acres representing 48.0 percent of the State. These soils apart from those of the shale-derived Gajah-Mati-Tavy Association, were derived from various types of alluvium.

Class 4 soils with a total acreage of 16,667, had the smallest distribution in the State. They occurred in two areas in the east and west of southern Perlis. The main area was covered by the Telok Series Soils whose major limitation for agricultural use was its acidity. The other area was occupied by poorly-drained saline soils located around the mouth of Sungei Perlis.

The total area of Class 5 soils in the State was 30,725 acres. Along the north-western border of Perlis was the main concentration of Class 5 soils represented by steep land of the Nakawn Range. Other Class 5 soils included the ridges in the north, isolated limestone hills and disturbed land occupied by urban areas,, quarries etc.

THE RELATIONSHIP OF PRESENT LAND USE TO SOIL SUITABILITY

General

In the study on the relationship between soil suitability and land use, the information from the soil suitability map (scale 2 miles to one inch) was transferred onto the land use map (scale 1:25,000) of Perlis using a Saltzman enlarger. The distribution of the major land use sub-categories under each soil suitability class was obtained by measuring from the land use maps using a dot grid. The result is shown in Tables C.1 of Appendix C. Since the soil suitability information was obtained from a generalised map, the percentages presented in the two tables should be taken as such that the accuracy of the stated figures is within plus or minus 3 percent. The relationship between the major land use sub-categories and the five Soil Suitability Classes is also illustrated graphically in figure 6 and 7.

The salient features of the relationship between land use and soil suitability are pointed out below:-

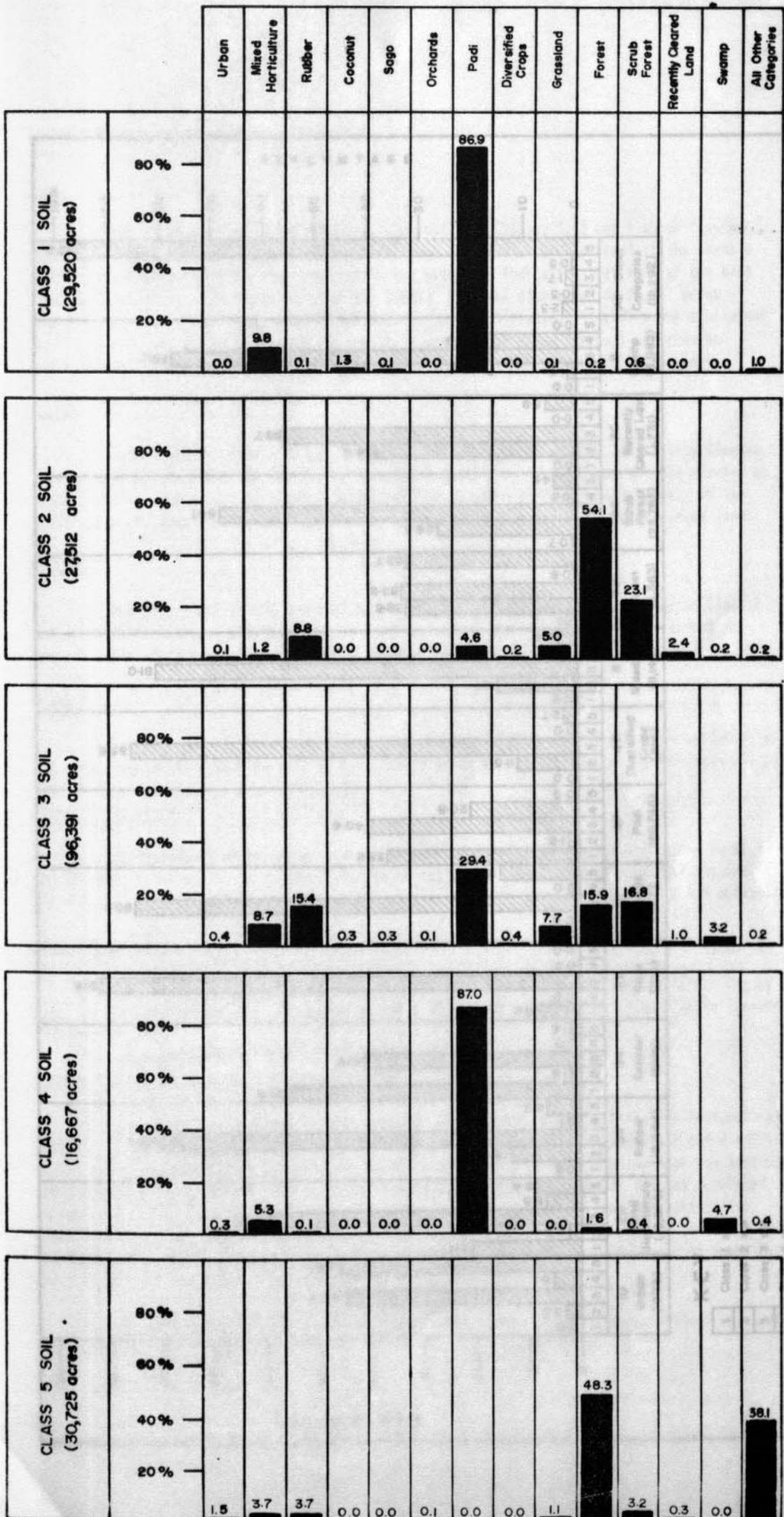


Figure 6: The percentage distribution of major land use sub-categories within each soil suitability class in Perlis.

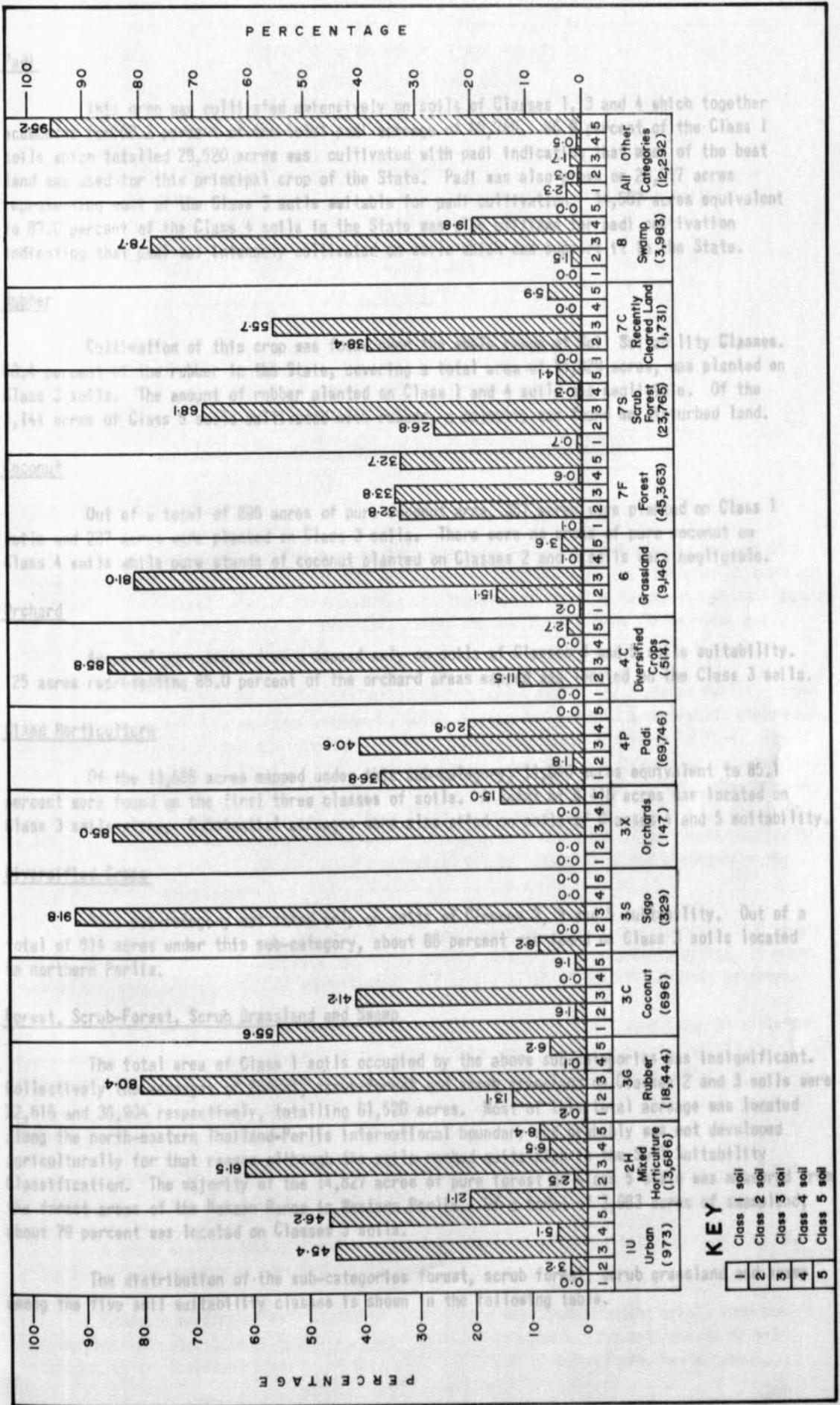


Figure 7. The percentage distribution of soil suitability classes within the significant land use sub-categories in Perlis

Padi

This crop was cultivated extensively on soils of Classes 1, 3 and 4 which together accounted for 98.2 percent of the total padi acreage of 69,746. 86.9 percent of the Class 1 soils which totalled 29,520 acres was cultivated with padi indicating that most of the best land was used for this principal crop of the State. Padi was also grown on 28,317 acres representing most of the Class 3 soils suitable for padi cultivation. 14,507 acres equivalent to 87.0 percent of the Class 4 soils in the State was also utilized for padi cultivation indicating that padi was intensely cultivated on soils which can support it in the State.

Rubber

Cultivation of this crop was found over the whole range of Soil Suitability Classes. 80.4 percent of the rubber in the State, covering a total area of 14,829 acres, was planted on Class 3 soils. The amount of rubber planted on Class 1 and 4 soils was negligible. Of the 1,144 acres of Class 5 soils cultivated with rubber, a majority was found on disturbed land.

Coconut

Out of a total of 696 acres of pure coconut area, 387 acres were planted on Class 1 soils and 287 acres were planted on Class 3 soils. There were no areas of pure coconut on Class 4 soils while pure stands of coconut planted on Classes 2 and 5 soils were negligible.

Orchard

Areas of pure orchard were mapped only on soils of Classes 3 and 5 soils suitability. 125 acres representing 85.0 percent of the orchard areas mapped was located on the Class 3 soils.

Mixed Horticulture

Of the 13,686 acres mapped under this sub-category, 11,646 acres equivalent to 85.1 percent were found on the first three classes of soils. A total of 8,416 acres was located on Class 3 soils alone. Substantial acreages were also sited on soils of Classes 4 and 5 suitability.

Diversified Crops

This sub-category was sited only on soils of Classes 2, 3 and 5 suitability. Out of a total of 514 acres under this sub-category, about 86 percent was found on Class 3 soils located in northern Perlis.

Forest, Scrub-Forest, Scrub Grassland and Swamp

The total area of Class 1 soils occupied by the above sub-categories was insignificant. Collectively the acreages of forest, scrub-forest and scrub grassland on Classes 2 and 3 soils were 22,616 and 38,904 respectively, totalling 61,520 acres. Most of this total acreage was located along the north-eastern Thailand-Perlis international boundary and probably was not developed agriculturally for that reason although the soils ranked quite high in the Soil Suitability Classification. The majority of the 14,827 acres of pure forest on Class 5 soils was measured from the forest areas of the Nakawn Range in Western Perlis. Of a total of 3,983 acres of swampland, about 79 percent was located on Classes 3 soils.

The distribution of the sub-categories forest, scrub forest, scrub grassland and swamp among the five soil suitability classes is shown in the following table.

TABLE 1. DISTRIBUTION OF FOREST, SCRUB FOREST,
SCRUB GRASSLAND AND SWAMP AMONG
THE FIVE SOIL SUITABILITY CLASSES

<u>Soil Suitability Class</u>	<u>Acreage</u>
1.	229 (0.8 percent of all Class 1 soils)
2.	22,676 (82.4 " " " " 2 ")
3.	42,038 (43.6 " " " " 3 ")
4.	1,142 (6.8 " " " " 4 ")
5.	16,130 (52.5 " " " " 5 ")
Total.	<u>82,215</u>

INDEX OF AERIAL PHOTOGRAPHY AND 1:25,000 LAND USE MAPPING

Photography

Aerial photographs at the scale of 1:25,000 taken in 1966 form the basic tool of this Survey. Hence it is thought desirable that the reader be made aware of the photographic coverage of Perlis. The original films of this coverage are lodged with the Directorate of National Mapping and prints can be made available to authorised bodies who may require them for carrying out a closer inspection of a particular area.

There are about 160 overlapping aerial photographs covering the State of Perlis. This coverage is represented by an index (Figure 8) which depicts the position of every 5th photograph, the flight line position and the negative film roll number containing a particular line. For example, the photographs stereoscopically covering Kangar Town in figure 8 would be referred to as, Roll C-45, Line 2, Photos 109 and 110. The State is covered by 9 north-south lines approximately 2.5 miles apart. The lateral overlap of these lines is approximately 30 percent with the strip width of a single line being about 3.5 miles. The photographs along the flight lines overlap by about 55 to 65 percent which means that the principal points (centres) of the photographs are approximately 1.4 miles apart.

Each aerial photograph measures 9" x 9" and covers an area of approximately 12.2 square miles. Since the lateral and forward lap are necessary to achieve stereoscopic effect, it means that each photograph only "gains" approximately 2.8 square miles of the stereoscopic coverage.

It should be noted that the aerial photographs covering Perlis were taken at different times during the year 1966. A record of the actual dates and times of exposure for all the photographs is kept in the Land Use Section, Department of Agriculture, Kuala Lumpur.

Mapping

Figure 8 also shows the index of the 1:25,000 land use mapping of Perlis. The State is covered by a total of 9 sheets at this scale.

A State Land Use Map at 2 miles to an inch compiled by generalising and reducing the 1:25,000 land use mapping is included in the report.

Land use mapping at both scales is available as uncoloured dyeline prints from the Land Use Section, Soil Science Division, Department of Agriculture. Requests should be made in writing to the Assistant Director of Research, Department of Agriculture, Kuala Lumpur.

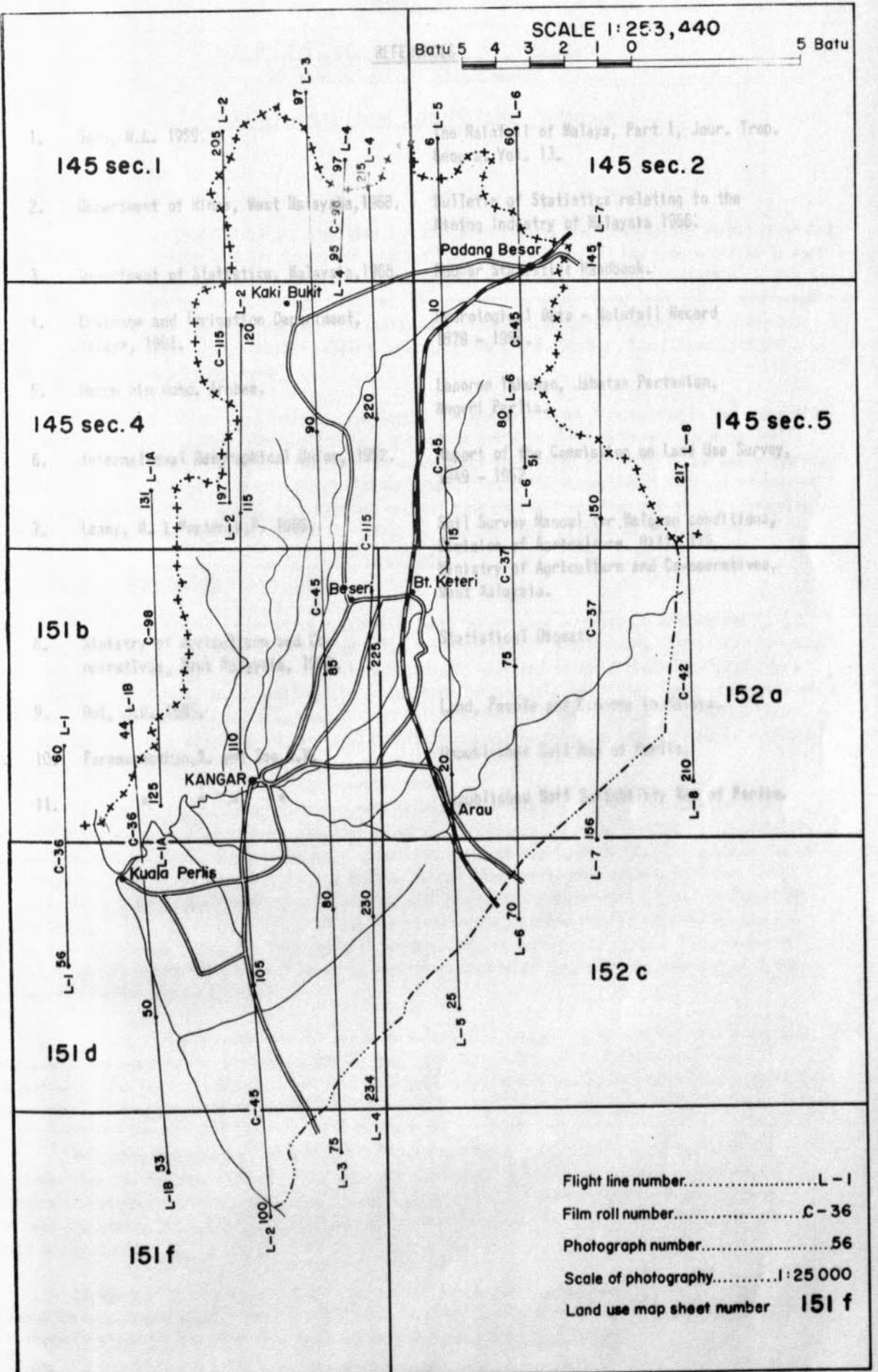


Figure 8. Index of 1966 aerial photography and 1:25 000 land use mapping for Perlis.

APPENDIX A

THE PRESENT LAND USE CLASSIFICATION LEGEND OF WEST MALAYSIA

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Category 8 "Swamps and Marshes" has been enlarged in concept to include all poorly drained land exhibiting seasonal or permanent waterlogging. It seems illogical to include this type of vegetation in the forest category as its very existence depends on a swamp environment and without this condition it would cease to exist.

The sub-categorisation of category 7 "Forest Land" has been kept to a minimum with the knowledge that the National Forestry Department are in fact presently executing a comprehensive forestry classification interpretation on the same photography. "Shifting Cultivation", however, has been included under Category 4 (Cropland) since this is a form of land use under which food crops are produced.

Category 5 "Improved Permanent Pasture" has been maintained although the total national acreage is exceedingly small. The few areas that do exist are being grown on an experimental basis, and there is a possibility that this land use type will expand in the future.

A detailed explanation of the Classification Legend follows.

THE LEGEND

APPENDIX A

THE PRESENT LAND USE SURVEY OF WEST MALAYSIA

THE LAND USE CLASSIFICATION LEGEND

For the Interpretation of 1:25,000 Aerial Photography

Introduction

The Land Use classification, developed for West Malaysia, is one based on the format presented by the Commission on World Land Use Survey for international application. It has been modified to more precisely meet the requirements of Land Use as found in West Malaysia, while still conforming to the internationally recognized and established system. The obvious advantage being that actual photographic interpretation and subsequent mapping will be immediately readable and understandable to a wide and growing group of specialists continually dealing with Land Use Classification, Land Capability and Agricultural Development Programmes.

The development of the classification legend now presented took five months to develop during which time preliminary legends were applied on a production basis to three different areas in West Malaysia, while reconnaissance trips were made to other areas possessing distinctive land use patterns. The writer believes that this legend allows photointerpretation to be accomplished with the minimum of deliberation; keeps field checking to a minimum; and yet enables the identification of all categories necessary for the subsequent compilation of meaningful Land Use Mapping and area measurements.

Classification Modifications

In developing the system of classification used for mapping land use in West Malaysia, two important requirements have been kept in mind. The first requirement is that any classification system should conform as closely as possible to an internationally used and accepted classification. The second requirement is that any classification system must include all significant land use types found within the area for which it is to be used. It is believed that this classification embodies these qualities and only in a minor way do the local modifications differ from the internationally accepted framework.

Two slight changes in nomenclature were considered necessary. First, the Commission's category 6 "Unimproved Grazing Land", has been re-named "Grasslands" because, although it is possible to interpret and map areas of low vegetative cover that might or might not be used for grazing, it is not always possible to accurately determine whether or not these areas are actually used for this purpose. In fact most small herds of cattle graze within and on the boundaries of some of the other categories; e.g. on road right of ways, within settlement areas, inside smallholding rubber areas and on some padi areas during the "offseason". Second, the Commission's category 9, "Unproductive Land" has been re-named "Unused Land" as it is considered unwise to negate the possibility of future use under hitherto unknown practices.

Category 8 "Swamps and Marshes" has been enlarged in concept to include all poorly drained land exhibiting seasonal or permanent waterlogging. It seems illogical to include this type of vegetation in the forest category as its very existence depends on a swamp environment and without this condition it would cease to exist.

The sub-categorisation of category 7 "Forest Land" has been kept to a minimum with the knowledge that the National Forestry Department are in fact presently executing a comprehensive forestry classification interpretation on the same photography. "Shifting Cultivation", however, has been included under Category 4 (Cropland) since this is a form of land use under which food crops are produced.

Category 5 "Improved Permanent Pasture" has been maintained although the total national acreage is exceedingly small. The few areas that do exist are being grown on an experimental basis, and there is a possibility that this land use type will expand in the future.

A detailed explanation of the Classification Legend follows.

THE LEGEND

1. Settlement and Associated Non-Agricultural Lands (Shades of Red)

1U: Urban and Associated Areas

The truly built-up areas of cities, towns, kampongs, including associated and surrounding parks and open spaces, detached industrial sites, settlement areas, reservoirs, etc. Areas obviously in the process of urban development showing evidence of a road pattern and house lots but presently without buildings are also included. Fringes of urban centres, strip development and most kampongs may be included in Sub-Category 2H "Mixed Horticulture" if more than 50% of the land is under horticultural use.

1E: Estate Building and Associated Areas

All areas of estate housing, schools, hospitals, administrative buildings and recreational land. When groups of these exceed three acres they are interpreted but individual and isolated buildings occupying less than this acreage are ignored.

1T: Tin Mining Areas

All areas previously laid waste and devoid of vegetation, areas being worked at present, and cleared land obviously designated for tin mining. Within these areas all water bodies greater than three acres are identified and given the code (W).

1X: Other Mining Areas

All other areas showing mining activity other than for tin.

1P: Power Lines

Power lines or transmission lines of a width greater than one hundred feet are interpreted where they interrupt the land use of the areas they traverse. If there is no disruption of the land use activity the presence of a power line is ignored; eg. a wide power line crossing a block of padi may not prevent the homogeneous development of the padi area. When a transmission line traverses and interrupts the continuous activity of a sub-category then the actual land use of the line is indicated in parenthesis; e.g. 1P(6) would indicate a power line swath with a ground cover of grassland.

2. Horticultural Lands (Shades of Deep Purple)

2H: Mixed Horticulture

This is a very wide and extensive sub-category including all the typical diversified "garden cultivation" found in a haphazard fashion around a family unit. It may be better visualised if it is realised that the terms, "Dusun" "Minor Cultivation", "Domestic Cultivation" and "Domestic Horticulture" were all considered as possible descriptions.

The essential basis is the family settlement unit with emphasis on the production of diversified crops for family needs with possibility of small surpluses being sold locally. Included are mixed vegetables, yams, tapioca, chillies, pineapples, fruit trees, bananas, papayas, coconuts etc.

The complexion of this sub-category changes according to geographical location, soil condition and local traditions but the essential feature is always diversification and the activity is intense and focused around the family unit.

Often this sub-category, although existing, is completely overshadowed by the importance of the activity within which it exists. For example, if it is present in small patches within an area of intense smallholding coconuts, then the area will merely be designated as coconuts. Also, where units of more than three acres of other sub-categories appear with a background of "Mixed Horticulture", they are then, of course, separately identified. It is not uncommon to find twenty-acre lots of smallholding coconuts, rubber and orchards within and on the periphery of "Mixed Horticulture".

The most common location is along roads, waterways and on the better drained sites of padi areas. Frequently this type forms buffer strips between estate and smallholding crops.

The interpreter's decision to designate an area as 2H is taken when homogeneous units of other sub-categories are not discernable and the intense land use activity is focused around rural settlement. Mixed tree crops (often very dense) intermingled with small garden plots, footpaths and housing are the cumulative criteria necessary for designation as 2H.

2M: Market Gardening

Areas where the obvious emphasis is on the commercial production of fresh vegetables. The pattern is that of intense neatness and use with individual units being small. These areas should not be confused with the larger areas of "Diversified Cropland" (4C) where the individual units are bigger and "high" crops such as tapioca, sugar and maize are obvious.

NOTE: Most market garden areas occur in or near large urban centres or in mountain areas favourable to temperate zone crops. In these latter areas, category 2M includes commercial flower gardens.

2E: Government Agricultural Stations

3. Tree, Palm and Other Permanent Crops

(The following sub-categories cover crops at all stages of growth and under various forms of management.)

3G: Rubber

3O: Oil Palm

3C: Coconut

3N: Pineapple

(Only commercially grown pineapple, sometimes by smallholders in conjunction with coconuts and principally for the canning industry).

3K: Coffee

3T: Tea

3A: Cocoa

3P: Pepper

3S: Sago Palm

3R: Areca nut Palm

3X: Orchards (Rambutan, Durian, Citrus, Clove, Nutmeg, etc.)

3H: Fish Ponds - (Excluded are some old tin excavation ponds often stocked with fish.)

When two of the crops mentioned above are found growing in a mixed fashion the area is designated by the number 3 followed by the letter of the tree or palm crop and then by the ground crop; e.g. 3CK describes an area of coconuts with intensive coffee cultivation beneath the coconuts.

4. Cropland (Shades of Brown)

4P: Padi
Double and single cropping padi areas.

4C: Diversified Crops

This sub-category covers a wide range of crops growing in reasonably large areas although the individual units (fields) may be quite small (3 to 20 acres). The size of the fields make it difficult to interpret the actual crop, especially when the same crop may be present at different stages of maturity within a mixed crop area which may also contain areas of fallow. Crops found in this sub-category are almost entirely annual with tapioca occupying the largest acreage. Other crops include maize, sugar, bananas, yams, sweet potatoes, tobacco etc.

NOTE:

Bananas appear in small units within this sub-category. It should however be realised that the bulk of the country's bananas grow within 2H "Mixed Horticulture" and in conjunction with young smallholding rubber. Within these areas they cannot be separately delineated at the present interpretation scale.

Within Malaysia bananas are not grown on a large scale commercial basis. If bananas did appear in large "plantation" areas, they would naturally be included under category 3.

4X: Shifting Cultivation

Shifting cultivation also referred to as "ladang" cultivation, describes an activity carried on by the Aborigines where primary forest areas are selected for cultivation, then cleared and planted with crops, and finally abandoned after a year or two as the soil loses its initial fertility. The most common crops planted are, upland rice (hill padi), tapioca, sweet potatoes, yams and maize. General areas of shifting cultivation are recognized by the cell-like appearance of small clearings in various stages of regenerating vegetation as well as newly cleared ladangs. Only the areas presently in use are identified and areas previously in use, but now abandoned, are identified according to the present vegetative cover. The sizes of these clearings vary between three and twenty acres.

NOTE:

It must be realised that many of the crops found in categories 3 and 4 are also found in small uninterpretable areas (less than 3 acres) within the collective sub-category 2H "Mixed Horticulture". Often the cumulative acreage of these crops within 2H "Mixed Horticulture" can be considerable.

5. Improved Permanent Pasture (Hatched Yellow)

The category at present covers an extremely small proportion of the country. But it is a category with possibilities of expansion. It includes land where selective grasses are being grown for grazing and for the production of marketable fodder.

6. Grasslands (Yellow)

Because of the difficulties created by detailed interpretation combined with the relative unimportance of this Category, it has been decided not to sub-categorize and so this Category includes areas of Lalang, Unimproved Coarse Pasture and Scrub-Grassland. The general appearance of the Category is grassland and areas are only included when shrubs and trees (generally below 15 feet) cover less than 50% of the area. When the scrub component covers more than 50% of an area it is designated as 7S "Scrub Forest".

Lalang, often occurring in "sheets" over extensive areas comprises an important part of this Category as do the grasses inhabiting the beach ridges ("permatang") of the east coast.

It is not always possible to accurately determine which areas within this Category are actually used for grazing and therefore it should be remembered that the title "grassland" does not imply an area of grazing. Only in a few local areas of the country are cattle intentionally grazed within this Category, which for the most part, is devoid of cattle.

Areas of grassland appearing in Urban (IU) and having no apparent recreational use are mapped in this Category.

Areas of grassland or scrub grassland appearing on erosion scars or on landslides are designated 6E.

7. Forest Land (Shades of Green)

7F: Forest

All dryland forests are present in this Category. It includes all primary forest and secondary forest or high "belukar", above about 15 feet in height. In a few areas the symbol 7F (R) denotes reforestation, afforestation and "treated" forests.

7S: Scrub Forest

This sub-category is used when more than 50% of an area is covered by shrubs, bushes, and young or dwarf trees, having a height of less than approximately 15 feet. It includes a) low "belukar", or secondary growth, which is in the first stage of regeneration of mature forest, and b) scrub vegetation whose occurrence is due to edaphic factors, such as the xerophytic scrub of the dry permatang.

Normally 7S would also include the dwarf Montane and Sub-Montane Forest growing on the thin soils of mountain summits and ridges of the interior. In these areas of primary forest this edaphically controlled dwarf scrub forest is not mapped. This sub-category is the only sub-category of land use that is mapped discontinuously. The reason being the unjustifiably high cost of mapping this relatively inconsequential type and also because a comprehensive forestry interpretation is being carried out by the Forestry Department.

NOTE:

If no agricultural land use activity is present on a complete land use map sheet, then the entire sheet is not interpreted and therefore not mapped. These areas are mostly in the interior of the country where natural montane dwarf vegetation is found. Hence considerable areas of this vegetation type are excluded by this survey.

7C: Recently Cleared Land

These are recently cleared areas where it is impossible to determine the future land use. For convenience these areas have been placed within the forest Category but it should be realised that they are not necessarily always areas cleared from forest; e.g. areas cleared from older rubber awaiting replanting into oil palm would come under this sub-category. These areas are recognized not only by a very "clean" appearance, but also by the presence of felled trees and traces of burning.

8. Swamp, Marshland and Wetland Forests (Blue-Green)

This category includes all poorly drained land exhibiting seasonal or permanent waterlogging. Wetland Grass and Forest Associations (including Mangrove, Nipah and Gelam) occur in this category, as well as Wetland Forest areas which have been recently cut-over.

9. Unused Land (Grey)

All areas, which by present practices, are unproductive; e.g. riverine and coastal beaches, mudflats, exposed rocks, cliffs, etc.

THE PRESENT LAND USE SURVEY OF WEST MALAYSIA
CONCISE FORM OF THE PRESENT LAND USE CLASSIFICATION LEGEND

For the Interpretation of 1:25,000 Aerial Photography

1. Settlements and Associated Non-Agricultural Lands (Shades of Red)
 - 1U : Urban and Associated Areas
 - 1E : Estate Buildings and Associated Areas
 - 1T : Tin Mining Areas
 - 1X : Other Mining Areas
 - 1P : Power Line Right of Ways

2. Horticultural Lands (Shades of Deep Purple)
 - 2H : Mixed Horticulture
 - 2M : Market Gardening
 - 2E : Agricultural Stations

3. Tree, Palm and Other Permanent Crops (Shades of Light Purple)
 - 3G : Rubber
 - 3O : Oil Palm
 - 3C : Coconut
 - 3N : Pineapple
 - 3K : Coffee
 - 3T : Tea
 - 3A : Cocoa
 - 3P : Pepper
 - 3S : Sago Palm
 - 3R : Arecanut Palm
 - 3X : Orchards - (Rambutan, Durian, Citrus, Cloves, Nutmeg, etc.)
 - 3H : Fish Ponds

4. Cropland (Shades of Brown)
 - 4P : Padi
 - 4C : Diversified Crops
 - 4X : Shifting Cultivation

5. Improved Permanent Pasture (Hatched Yellow)

6. Grassland (Yellow)
 - 6 : Lalang, Unimproved Coarse Pasture and Scrub-Grassland.

7. Forest Land (Shades of Green)
 - 7F : Forest
 - 7S : Scrub Forest
 - 7C : Recently Cleared Land (Black Hatching - No Colour)

8. Swamp, Marshlands and Wetland Forests (Blue-Green)
 - 8 : Wetland Grass and Forest Associations, including Mangrove, Nipah and Gelam.

9. Unused Land (Grey)

APPENDIX B

LAND USE SUMMARY OF PERLIS

Land use acreage figures for all nine categories and their sub-categories pertaining to the one-district State of Perlis have been summarised and tabulated in table B.1. These figures are also presented as percentages of the State. The table also indicates the area and the percentage of the State under agricultural use. In addition, the categories under agricultural use and their sub-categories are presented as percentages of the total area under agricultural use.

Supplementary information viz. area of West Malaysia (national area) as per Directorate of National Mapping and the population figures for West Malaysia and Perlis as per Statistics Department June 1966 estimates are also included in the table. With these extra information, the followings have been computed:- a) the percentage coverage of Perlis to that of West Malaysia, b) the population of Perlis as a percentage of the total West Malaysian population, c) population densities of the State and of the agriculturally used land.

The total land use acreage and the physical area of the State are based on measurement of land use compilations and include all land areas indicated on the 1:25,000 aerial photographs taken in 1966.

PRESENT LAND USE SURVEY - 1966
TABLE B.1. STATE LAND USE SUMMARY - PERLIS

AREAS TAKEN FROM 1:25,000 LAND USE MAPPING COMPILED FROM THE INTERPRETATION OF 1966 AERIAL PHOTOGRAPHY

STATE AREA:- LAND USE ACREAGE 200,815 (313.77 SQ. MILES) PHYSICAL ACREAGE 200,815 (313.77 SQ. MILES)*

NATIONAL AREA	SQUARE MILES 50,806 [△]	ACRES 32,515,840
PERCENTAGE OF NATIONAL AREA: 0.62		
POPULATION: * 115,033	% OF NATIONAL POPULATION: 1.4	
POPULATION DENSITY	PER SQUARE MILE 366.62	PER ACRE 0.57
AGRICULTURALLY USED LAND	SQUARE MILES 161.89	ACRES 103,608
POPULATION DENSITY ON AGRICULTURALLY USED LAND	PER SQUARE MILE 710.56	PER ACRE 1.11

LAND USE CATEGORY	D I S T R I C T P E R L I S		MAJOR LAND USE CATEGORIES IN ACRES	%	LAND UNDER AGRICULTURAL USE IN %		
		%			MAJOR CATEGORIES	SUB-CATEGORIES	
1U: URBAN	973	0.5	URBAN AND ASSOCIATED AREAS 1,025	0.5	0.5		1U
1E: ESTATE BUILDINGS	16	-					1E
1T: TIN MINING							1T
1X: OTHER MINING, QUARRYING	36	-					1X
1P: TRANSMISSION LINE							1P
2H: MIXED HORTICULTURE	13,686	6.8	HORTICULTURE 13,732	6.8	13.2	13.2	2H
2M: MARKET GARDENING	40	-					2M
2E: AGRICULTURAL STATIONS	6	-					2E
3G: RUBBER	18,444	9.2	TREE, PALM AND PERMANENT CROPS 19,616	9.8	18.9	18.9	3G
3O: OIL PALM							3O
3C: COCONUTS	696	0.3					3C
3N: PINEAPPLE							3N
3K: COFFEE							3K
3T: TEA							3T
3A: COCOA							3A
3P: PEPPER							3P
3S: SAGO	329	0.2					3S
3R: ARECANUT PALM							3R
3H: FISH & HYACINTH PONDS			3H				
3X: ORCHARDS	147	0.1					3X
4P: PADI	69,746	34.7	CROPLAND 70,260	35.0	67.8	67.8	4P
4C: DIVERSIFIED CROPS	514	0.2					4C
4X: SHIFTING CULTIVATION							4X
5 : IMPROVED PERMANENT PASTURE							5
6 : GRASSLAND	9,146	4.6	9,146	4.6	99.9	99.9	6
7F: FOREST	45,363	22.6	FOREST AND SCRUBLAND 69,128	34.4			7F
7S: SCRUB FOREST	23,765	11.8					7S
7C: RECENTLY CLEARED LAND	1,731	0.9	1,731	0.9			7C
8 : SWAMP	3,983	2.0	3,983	2.0			8
9 : UNUSED LAND	11,838	5.9	11,838	5.9			9
UNCLASSIFIED	356	0.2	356	0.2			
TOTAL	200,815	100.0	200,815	100.1	TOTAL ACREAGE UNDER AGRICULTURAL USE 103,608 PERCENTAGE OF STATE AREA UNDER AGRICULTURAL USE 51.6		

* This is a State Population Estimate for June 1966 supplied by the Statistics Department and indicates an increase of 34% over the 1957 Census Total.

+ This acreage total is based on measurement of all land areas indicated on the 1:25,000 aerial photographs taken in 1966.

△ As indicated by the Directorate of National Mapping.

PRESENT LAND USE SURVEY - 1966

TABLE C.1. ACREAGES OF SOIL SUITABILITY CLASSES WITHIN THE STATE OF PERLIS

SOIL SUITABILITY CLASS	P E R L I S	%
1	29,520	14.7
2	27,512	13.7
3	96,391	48.0
4	16,667	8.3
5	30,725	15.3
TOTAL	200,815	100.0

TABLE C.2. LAND USE ACREAGES OF SIGNIFICANT CATEGORIES IN RELATION TO SOIL SUITABILITY CLASSES FOR PERLIS

LAND USE CATEGORY	LAND USE ACREAGES WITHIN SOIL SUITABILITY CLASSES										STATE TOTAL OF LAND USE CATEGORIES	% OF STATE	% OF LAND USE CATEGORY WITHIN EACH SOIL SUITABILITY CLASS				
	1	%	2	%	3	%	4	%	5	%			1	2	3	4	5
	1U: URBAN	-	-	31	0.1	442	0.4	50	0.3	450			1.5	973	0.5	-	3.2
2H: MIXED HORTICULTURE	2,888	9.8	342	1.2	8,416	8.7	890	5.3	1,150	3.7	13,686	6.8	21.1	2.5	61.5	6.5	8.4
3G: RUBBER	37	0.1	2,416	8.8	14,829	15.4	18	0.1	1,144	3.7	18,444	9.2	0.2	13.1	80.4	0.1	6.2
3C: COCONUTS	387	1.3	11	-	287	0.3	-	-	11	-	696	0.3	55.6	1.6	41.2	-	1.6
3S: SAGO	27	0.1	-	-	302	0.3	-	-	-	-	329	0.2	8.2	-	91.8	-	-
3X: ORCHARDS	-	-	-	-	125	0.1	-	-	22	0.1	147	0.1	-	-	85.0	-	15.0
4P: PADI	25,666	86.9	1,256	4.6	28,317	29.4	14,507	87.0	-	-	69,746	34.7	36.8	1.8	40.6	20.8	-
4C: DIVERSIFIED CROPS	-	-	59	0.2	441	0.4	-	-	14	-	514	0.2	-	11.5	85.8	-	2.7
6 : GRASSLAND	18	0.1	1,381	5.0	7,409	7.7	9	-	329	1.1	9,146	4.6	0.2	15.1	81.0	0.1	3.6
7F: FOREST	45	0.2	14,879	54.1	15,333	15.9	272	1.6	14,834	48.3	45,363	22.6	0.1	32.8	33.8	0.6	32.7
7S: SCRUB FOREST	166	0.6	6,369	23.1	16,185	16.8	71	0.4	974	3.2	23,765	11.8	0.7	26.8	68.1	0.3	4.1
7C: RECENTLY CLEARED LAND	-	-	665	2.4	964	1.0	-	-	102	0.3	1,731	0.9	-	38.4	55.7	-	5.9
8 : SWAMP	-	-	60	0.2	3,134	3.2	789	4.7	-	-	3,983	2.0	-	1.5	78.7	19.8	-
ALL OTHER CATEGORIES	286	1.0	43	0.2	207	0.2	61	0.4	11,695	38.1	12,292	6.1	2.3	0.3	1.7	0.5	95.1
TOTAL	29,520	100.1	27,512	99.9	96,391	99.8	16,667	99.8	30,725	100.0	200,815	100.0					

APPENDIX D

SOIL SUITABILITY CLASSIFICATION FOR WEST MALAYSIA

The soil suitability classification presented here is based on the revised scheme adopted by the Soil Science Division of the Department of Agriculture, Kuala Lumpur. This revised scheme takes into consideration all crops, that is, perennial (tree) crops and padi (wetland) cultivation besides arable farming as forms of land use.

The broad outline of this classification is presented here together with the parameters, as indicated in table D. 1, by which the soils of the State have been classified.

Class 1. Soil with no limitations or one or more minor limitations to agricultural development

The soils in Class 1 are suitable for the widest range of crops. They can be profitably cultivated under standard management practices. These soils occur on flat to very gently undulating terrain (0-6°) and erosion on them is negligible. They hold water well and have a high nutrient-retaining capacity. They are well suited to continuous cropping on a sustained yield basis.

The most versatile soils in this class are those found in flat areas where they can be utilized for a very wide range of dryland crops or irrigated for padi cultivation. These are deep well structured soils with a very high clay content.

Class 2. Soils with one or more moderate limitation to agricultural development

These soils are suitable for a narrower range of crops than Class 1 soils. A moderate level of management is necessary to obtain economic returns from crops grown on them. Management practices include erosion control measures, minor drainage and irrigation works, or improvements in the air and water relations when the soils are cultivated.

Class 3. Soils with at least one serious limitation to agricultural development

As Class 3 soils possess at least one serious limitation, they are restricted to a narrow range of crops. Even so, a high standard of management is necessary to develop or conserve these soils for long term agricultural productivity. Necessary management practices may include erosion control measures, an intensive fertilizer programme and/or drainage and irrigation works involving moderate expense.

Class 4. Soils with more than one serious limitation to agricultural development

In having more than one serious limitation the soils in Class 4 are limited to a very narrow choice of crops, often only to specific crops. Even though the choice of crops is very narrow, management practices have to be of a very high standard if the continuing productivity of the soils is to be maintained. Major conservation or amelioration measures are necessary if these soils are to be cultivated on a long term basis.

Class 5. Soils with at least one very serious limitation to agricultural development

Included within this class are soils which are unsuitable for agricultural development in their present condition. Where they are not built over for urban development or excavated for mining and quarrying purposes these soils are best allowed to continue under mature and/or regenerating forest.

FACTORS LIMITING CROP GROWTH

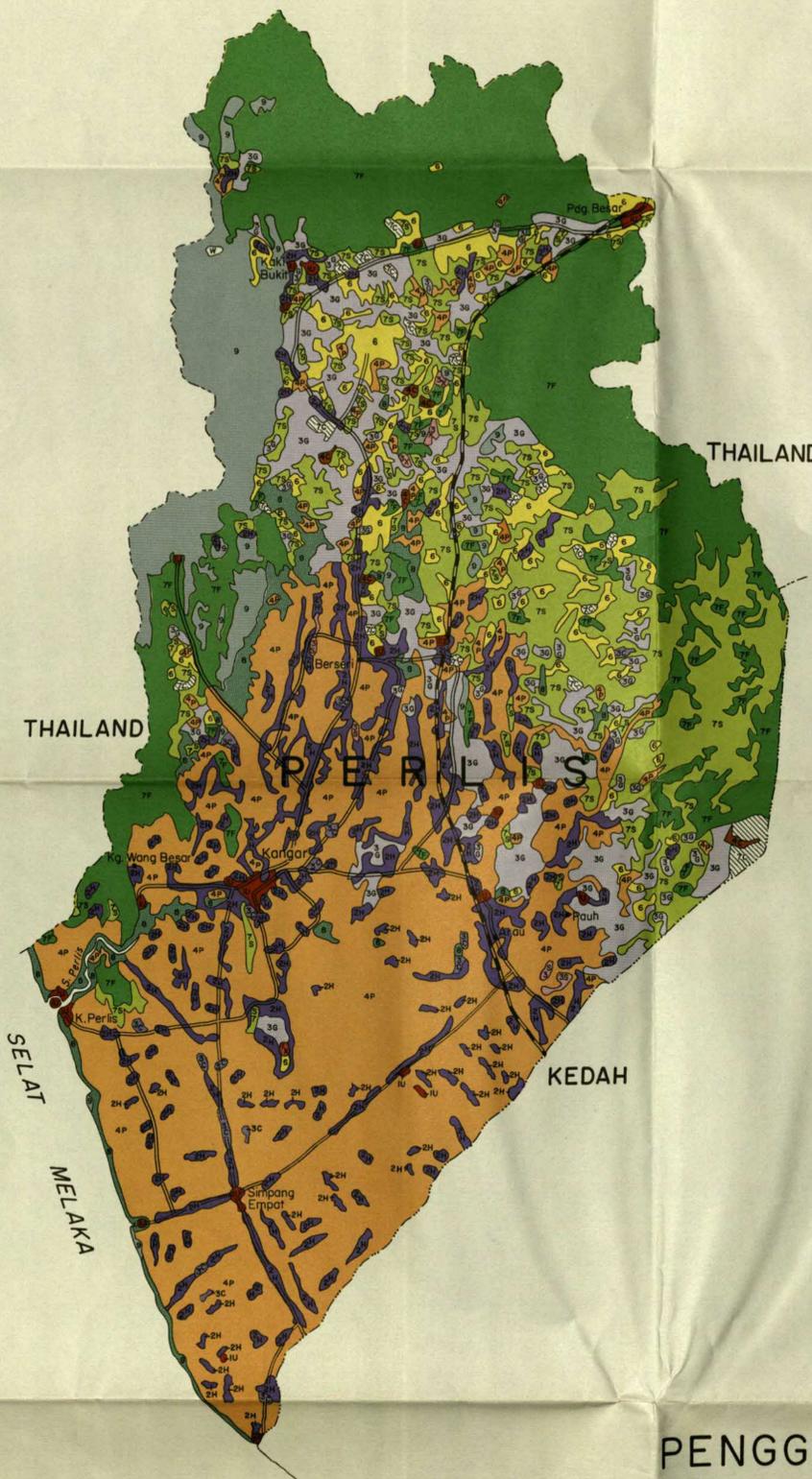
SYMBOL	TYPE	VERY SERIOUS	SERIOUS	MODERATE	MINOR
f	GRADIENT AND TEXTURE	20° slopes with light textured soils. or 35° slopes with heavy textured soils.	12°-20° slopes with light textured soils. or 20°- 35° slopes with heavy textured soils.	6°-12° slopes with light textured soils. or 12°- 20° slopes with heavy textured soils.	2°-6° slopes with light textured soils. or 2° - 12° slopes with heavy textured soils.
d	DRAINAGE	-	Very poorly to poorly drained or Excessively drained.	Imperfectly drained or Somewhat excessively drained	Moderately well drained.
i	DEPTH TO CONTINUOUS IMPENETRABLE LAYER	Less than 6 inches.	6 inches to 1 foot.	1 to 2 feet.	2 to 3 feet.
t	TEXTURE AND STRUCTURE	-	Very heavy textured and weakly or coarsely structured. or Very light textured and weakly structured.	Moderately heavy textured and weakly or coarsely structured. or Moderately light textured and weakly structured.	Heavy or light textured and weakly structured.
s	SALINITY	-	Saline condition 0 to 1 foot from the surface.	Saline condition 1 to 2 feet from the surface.	Saline condition 2 to 3 feet from the surface.
a	ACID SULPHATE LAYER	0 to 6 inches from the surface.	6 inches to 1 foot from the surface.	1 to 2 feet from the surface.	2 to 3 feet from the surface.
o	ORGANIC HORIZON	-	4 feet thick or thicker at the surface.	2 to 4 feet thick at the surface.	1 to 2 feet thick at the surface.
r	ROCKINESS	Extreme (> 75% of soil surface covered).	Moderately extreme (50-75% of soil surface covered).	Moderate (25-50% of soil surface covered).	Slight (10-25% of soil surface covered).
n	NUTRIENT IMBALANCE	Toxicity caused by extremely high contents of certain elements.	-	Acute nutrient deficiencies.	Moderate nutrient deficiencies.
h	HUMAN	Disturbed land.	-	-	-

BUTIR₂ DI-DAPATI DARIPADA TAFSIRAN GAMBARFOTO UDARA 1:25,000 YANG DI-AMBIL DALAM TAHUN 1966

BASED ON THE INTERPRETATION OF 1:25,000 AERIAL PHOTOGRAPHY TAKEN IN 1966.

PETUNJOK PENGELASAN PENGGUNAAN TANAH LAND USE CLASSIFICATION LEGEND

- 1 KAWASAN TEMPAT TINGGAL DAN KAWASAN BERKAITAN BUKAN PERTANIAN**
Settlements and Associated Non-Agricultural Areas
 - 1U KAWASAN BANDARAN DAN YANG BERKAITAN
Urban and Associated Areas
 - 1E KAWASAN BANGUNAN LADANG DAN YANG BERKAITAN
Estate Buildings and Associated Areas
 - 1T KAWASAN LOMBONG BIJAH TIMAH
Tin Mining Areas
 - 1R KAWASAN LOMBONG LAIN₂ GALIAN
Other Mining Areas
 - 2 KAWASAN PERKEBUNAN**
Horticultural Lands
 - 2H PERKEBUNAN CHAMPOR
Mixed Horticulture
 - 2M PERKEBUNAN SAYUR₂ DAN BENDA MAKANAN
Market Gardening
 - 2A PUSAT PERCUBAAN PERTANIAN
Agricultural Station
 - 3 POKOK, PALMA DAN LAIN₂ TANAMAN KEKAL**
Tree, Palm and other Permanent Crops
 - 3G GETAH
Rubber
 - 3D KELAPA SAWIT
Oil Palm
 - 3C KELAPA
Coconut
 - 3N NENAS
Pineapple
 - 3K KOP
Coffee
 - 3T TEH
Tea
 - 3A KOKO
Cocoa
 - 3P LADA HITAM
Pepper
 - 3S REMBIA
Sago
 - 3X DUSUN - (RAMBUTAN, DURIAN, LIMAU, CHENGEK, PALA, DLL.)
Orchards - (Rambutan, Durian, Citrus, Cloves, Nutmeg etc.)
 - 3R PINANG
Areca-Nut
 - 4 KAWASAN TANAMAN**
Cropland
 - 4P PADI
Rice
 - 4C PELBAGAI TANAMAN
Diversified Crops
 - 4E PENANAMAN BERPINDAH₂
Shifting Cultivation
 - 5 KAWASAN TERNAK KEKAL YANG TELAH DI-PERBAIKI**
Improved Permanent Pasture
 - 5A KAWASAN TERNAK KEKAL YANG TELAH DI-PERBAIKI
Improved Permanent Pasture
 - 6 PADANG RUMPUT**
Grasslands
 - 6 LALANG DAN KAWASAN TERNAK YANG TERBIAR DAN/ATAU PADANG RUMPUT SEMAK
Lalang and Unimproved Coarse Pasture and/or Scrub-Grassland
 - 7 KAWASAN HUTAN**
Forest Land
 - 7F HUTAN
Forest
 - 7S BELUKAR POKON RENDAH
Scrub Forest
 - 7C CHERANG BAHARU (KAWASAN YANG TELAH DI-BERSIHKAN DARIPADA HUTAN DAN KEBUN₂ GETAH TUA)
Recently Cleared Land (Areas generally cleared from Forest or Old Rubber)
 - 8 HUTAN PAYA DAN BUYAU**
Swamp, Marshlands and Wetland Forest
 - 8 TERMASOK BAKAU, NIPAH, GELAM DAN LAIN₂ KUMPULAN HUTAN BUYAU
Includes Mangrove, Nipah, Gelam and other Wetland Forest Associations
 - 9 KAWASAN YANG TIDAK DI-USAHAKAN**
Unused Land
 - 9 KAWASAN YANG TIDAK DI-USAHAKAN
Unused Land
- Coffee**
- Numerous occurrences, within localized areas, of a sub-category too small to be mapped are indicated by notation -- Tea, Coffee, Tobacco etc. Where these sub-categories occur in equal proportions they are indicated by horizontal hatching.

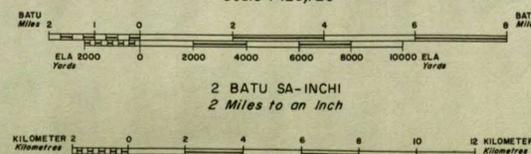


PETUNJOK Reference

- SEMPADAN ANTARA-BANGSA
International Boundary
- SEMPADAN NEGERI
State Boundary
- SEMPADAN DAERAH
District Boundary
- JALAN RAYA
Road
- JALAN KERETAPI
Railway
- SUNGAI, TASEK
River, Lake

PENGGUNAAN TANAH SEKARANG PRESENT LAND USE PERLIS

SEKIL 1:126,720
Scale 1:126,720



DI-SEDIAKAN OLEH CHAWANGAN PENYIASATAN PENGGUNAAN TANAH, BAHAGIAN SAINS TANAH, BAHAGIAN PERTANIAN, KEMENTERIAN PERTANIAN DAN SHARIKAT KERJA SAMA, MALAYSIA, KUALA LUMPUR. DI-BANAH ARAHAN PAKAR₂ RANCANGAN COLOMBO CANADA-MALAYSIA. LOCKWOOD SURVEY CORPORATION LIMITED, TORONTO, CANADA. DI-SAMA-KERJA DENGAN JABATAN PERMATAAN NEGARA, MALAYSIA, 1969.

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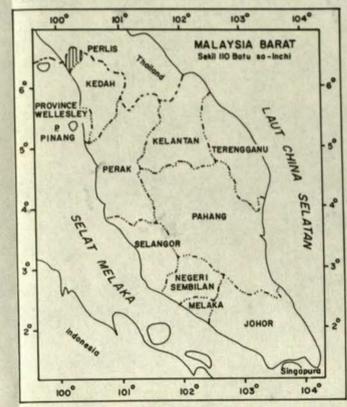
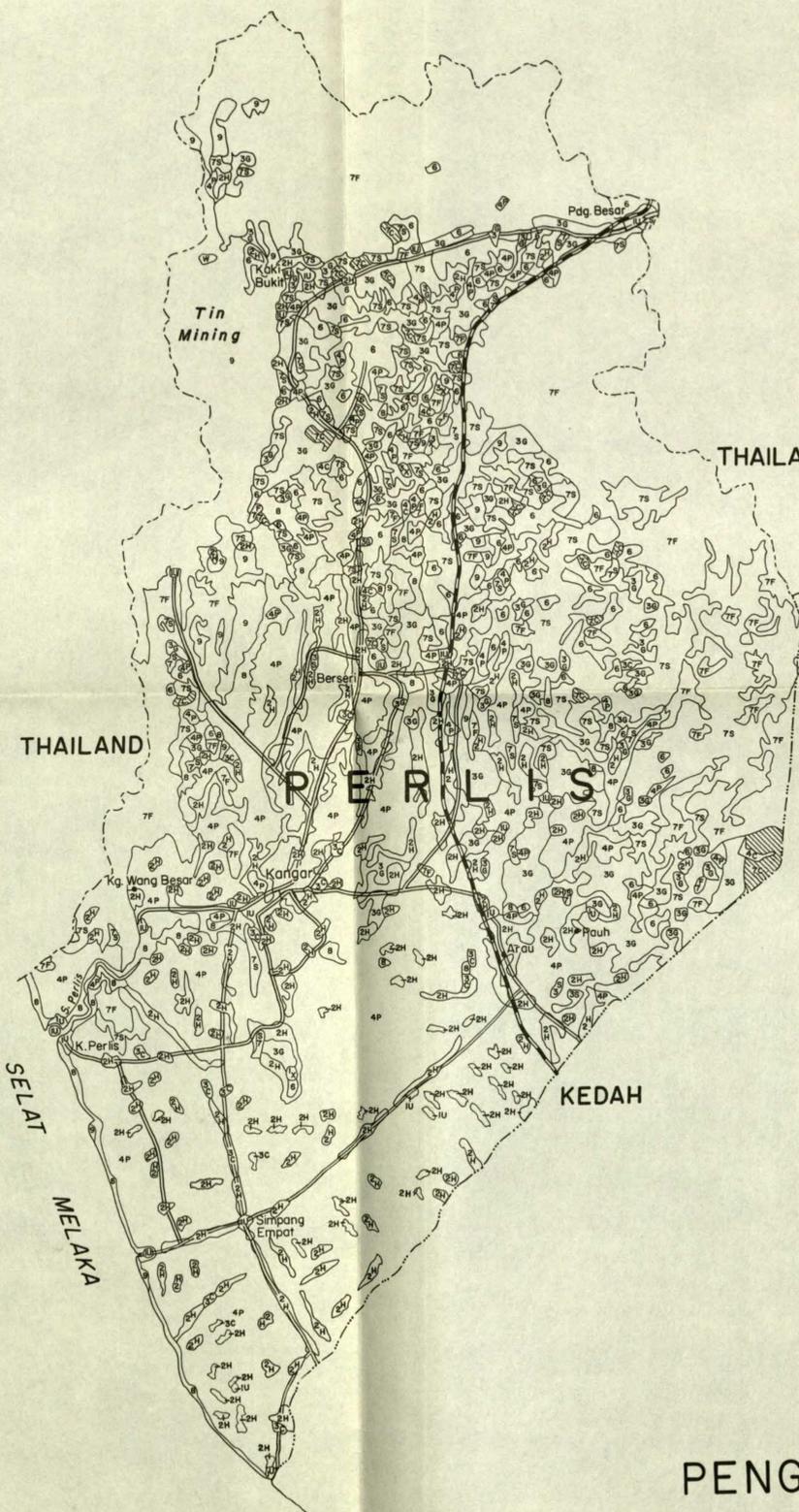
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 - 8 TERMASOK BAKAU, NIPAH, SELAM DAN LAIN₂ KUMPULAN HUTAN BUYAU
Includes Mangrove, Nipah, Selam and other Wetland Forest Associations
 - 9 KAWASAN YANG TIDAK DI-USAHAKAN
Unused Land
 - 9 KAWASAN YANG TIDAK DI-USAHAKAN
Unused Land
- Coffee**
- PELBAIGI TANAMAN JENIS KEDUA DI-DALAM SA-SUATU KAWASAN TERTENTU YANG TIDAK DAPATI DI-PETAKAN DI-TANDAKAN. -- TEH, KOPI, TEMBAKAU DLL. APABILA TERDAPAT JENIS KEDUA DALAM KADAR YANG SAMA IA DI-TUNJUKKAN DENGAN LOREKAN LINTANG.
- Numerous occurrences, within a localized area, of a sub-category too small to be mapped are indicated by annotation -- Tea, Coffee, Tobacco etc. Where these sub-categories occur in equal proportions they are indicated by horizontal hatching.



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State Boundary
 - SEMPADAN DAERAH
District Boundary
 - JALAN RAYA
Road
 - JALAN KERETAPI
Railway
 - SUNGAI, TASEK
River, Lake

DI-SEDIAKAN OLEH CHAWANGAN PENYIASATAN PENGGUNAAN TANAH, BAHAGIAN SAINS TANAH, BAHAGIAN PERTANIAN, KEMENTERIAN PERTANIAN DAN SHARIKAT KERJASAMA, MALAYSIA, KUALA LUMPUR. DI-BERIKAN ARAHAN RAKARU RANCANGAN COLOMBO CANADA-MALAYSIA, LOCKWOOD SURVEY CORPORATION LIMITED, TORONTO, CANADA, DENGAN KERJASAMA JABATANARAH PEMETAAN NEGARA, MALAYSIA, 1969.

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